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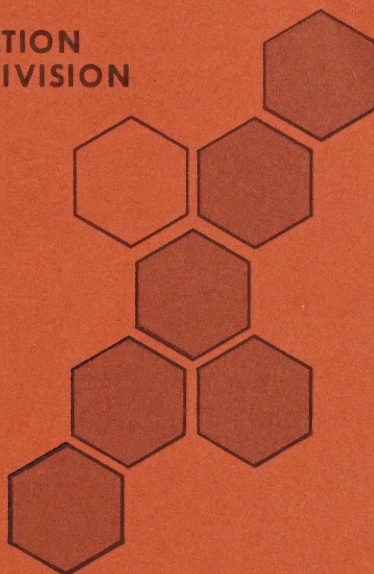
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ECONOMIC EFFECTS OF ALTERNATIVE PROGRAMS
AND MARKET PRICES ON SELECTED
COTTON FARMS IN THE SOUTHEAST

by

W.D. Givan and W.C. McArthur

FARM PRODUCTION
ECONOMICS DIVISION

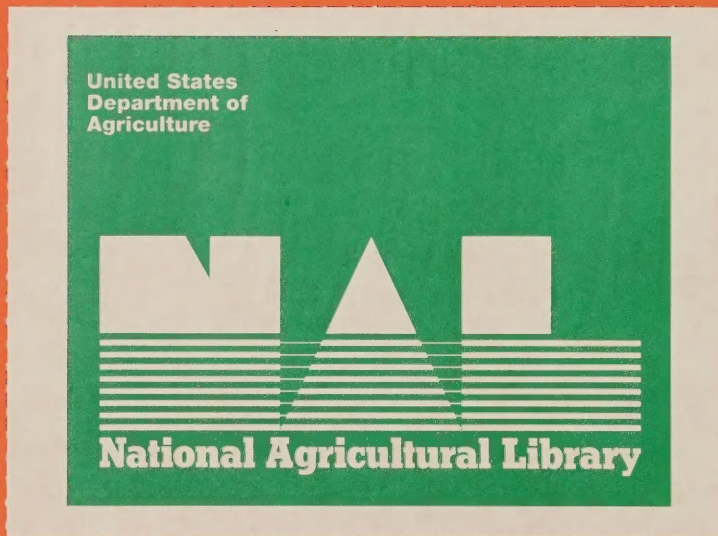
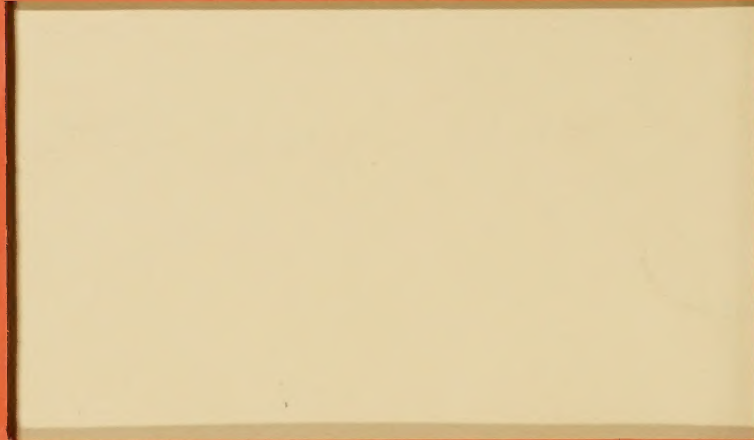


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March 1973

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ECONOMIC EFFECTS OF ALTERNATIVE PROGRAMS AND MARKET
PRICES ON SELECTED COTTON FARMS IN THE SOUTHEAST

W. D. Givan and W. C. McArthur*

INTRODUCTION

Cotton acreage in the United States has declined over one-third since 1960 due primarily to a declining demand for cotton products (1). The decline has been more marked in areas where cotton lacks a comparative advantage. In the Southeast U. S., cotton acreage decreased 40 percent during this time span, dropping from 16.3 percent to 12.6 percent of the U. S. total.^{1/}

Within the Southeast, more than one-half the total cotton is produced in three separate geographic areas (1) -- the Coastal Plain of South Carolina and Georgia, the Limestone Valley of Alabama, and the Brown Loam of Tennessee (Table 1). Economic analyses have shown these three areas to be more efficient in producing cotton than other areas in the Southeast (2, 3). The more efficient operating units in particular are found among the larger farms.

The effect of aggregate policy and other factors on individual producing units is a key consideration in developing farm policy and programs. In addition to the aggregate impact of programs, there is a need to identify and evaluate the impact of program changes at the level where individual production decisions are made. The decision to participate or not participate in a specific program depends, among other things, on expected returns from different program options. Individual

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^{1/}Southeast U. S. included the states of Alabama, Georgia, Florida, South Carolina, North Carolina, Tennessee, Kentucky, Virginia, and West Virginia.

Table 1. Cotton: Acres Planted in Coastal Plain, Limestone Valley, Brown Loam Areas, and Southeast United States, 1962-1971^{a/}

Year	Acres Planted				Acres as a percent of 1962			
	Coastal Plain	Limestone Valley	Brown Loam	Southeast U. S.	Coastal Plain	Limestone Valley	Brown Loam	Southeast U. S.
	1,000 acres				Percent (1962 = 100)			
1962	766	499	417	3,232	100	100	100	100
1963	710	439	390	3,003	93	88	94	93
1964	716	423	386	2,996	93	85	93	93
1965	659	439	383	2,862	86	88	92	89
1966	451	324	305	2,019	59	65	73	62
1967	270	279	266	1,705	35	56	64	53
1968	479	308	314	1,942	63	62	75	60
1969	460	318	334	1,955	60	64	80	60
1970	456	324	338	1,939	60	65	81	60
1971	481	334	356	2,047	63	67	85	63

Source: Annual County Estimates, published annually by the Statistical Reporting Service of each state.

^{a/} The Coastal Plain is located in Georgia and South Carolina; the Limestone Valley is located in Northern Alabama; the Brown Loam is located in Western Tennessee. See Figure 1 for a detailed location of these areas and the area encompassed in the Southeast U. S.

farm analysis traditionally assumes average or representative farm situations as the unit of analysis. In this study large viable farms are used as the unit of analysis with emphasis on the effect of changes in market and program conditions on income and resource use. The results will provide information that can be used in policy considerations, farm decision making, and as inputs for aggregate analysis.

Objectives

The objectives of this study are:

- 1) To depict the resource availability and efficiencies of production on selected individual farms in major cotton producing areas of the Southeast, and
- 2) To estimate, for these farms, the effects of changes in the cotton program of the 1970 Agricultural Act and of changes in the prices of cotton and competing crops.

FRAMEWORK FOR ANALYSIS

Farms Studied

Three farms, with cotton as a major source of income were selected for study. One farm is located in the Coastal Plains, one in the Limestone Valley, and one in the Brown Loam area (Figure 1). The farms were selected with the help of agricultural specialists in each area after visiting and reviewing several farms. These farms are not considered to be statistically representative of any specific group of farms. They are farms where size and enterprise combinations permit earning a livelihood from cotton production. The technology in use on these farms is characteristic of the technology presently found in the top 25-30 percent of the farms in each area. Adjustments were made in the resource base and organization of each farm to prevent disclosure of individual farm organizations (Table 2).

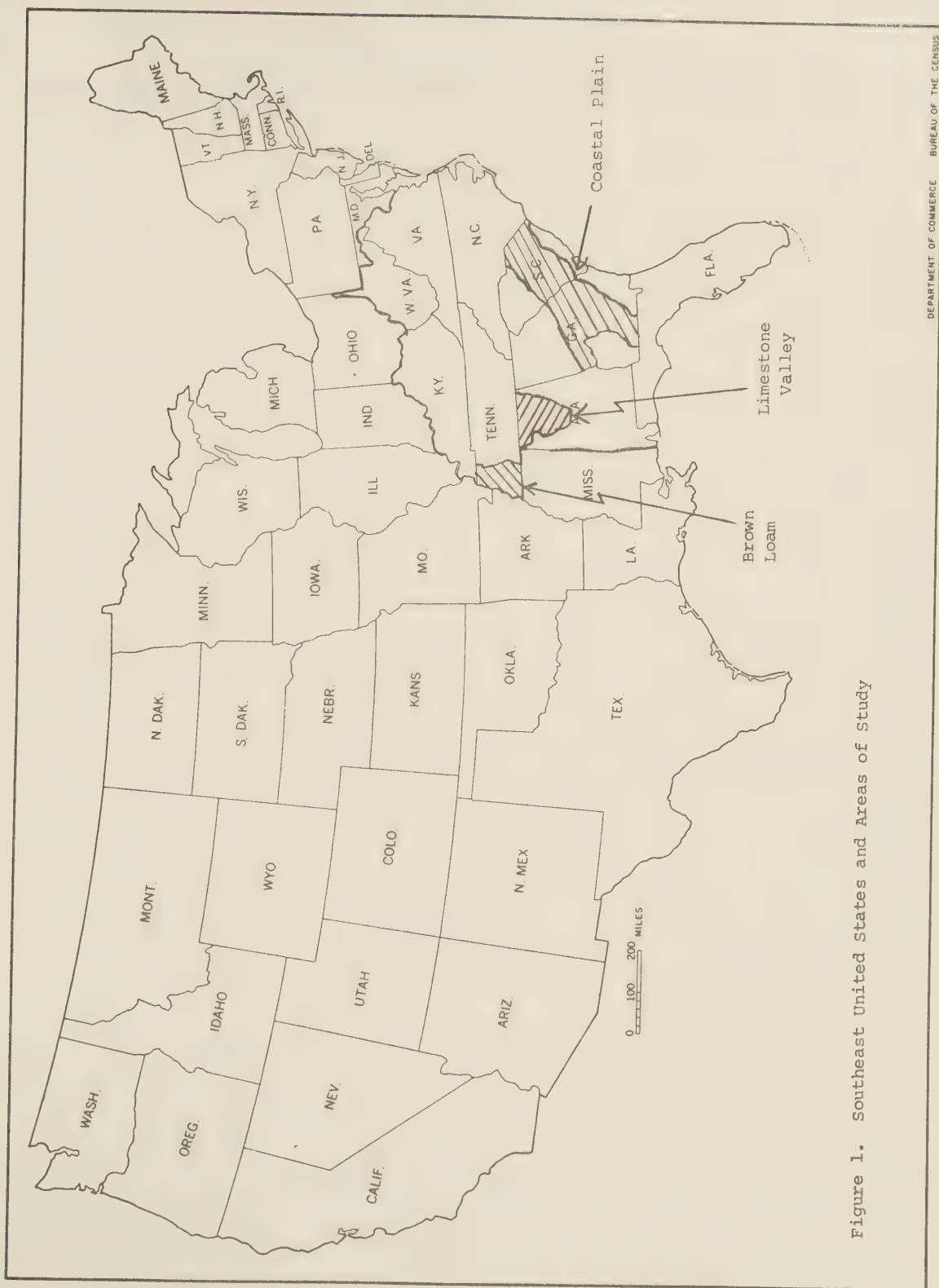


Figure 1. Southeast United States and Areas of Study

Table 2. Land Resources and Crop Allotments for Cotton Study Farms,
Southeast United States

Item	Unit	Coastal Plain, Georgia	Limestone Valley, Alabama	Brown Loam, Tennessee
<hr/>				
Owned resource:				
Cropland	Acre	200	300	800
Cotton allotment	Acre	100	125	350
Corn base	Acre	0	40	0
Rented resource:				
Cropland	Acre	400	400	0
Cotton allotment	Acre	150	175	0
Lease allotment	Acre	150	125	100
Corn base	Acre	0	0	0
Total resources available:				
Cropland	Acre	600	700	800
Cotton allotment	Acre	400	425	450
Corn base	Acre	0	40	0

Production Alternatives, Prices, and Costs

Variable costs were estimated from farm records for all enterprises on each farm (Table 3). Crops which have been produced in recent years or those crops in which the operator expressed an interest in producing were also considered in the analysis. Yield estimates reflect operator expectations for a normal crop year.

Input prices used were current prices (1972) for the study areas. Government price supports and direct payment rates were the levels announced for 1972. Product market prices were based on farmers price expectations for 1972.

Production Restraints

Land

The land owned by each operator was treated as a fixed resource. Land presently being rented was considered a continuous alternative to the operator at a specified cost. Cash rent for land without any allotment or base was \$15 per acre. Rental rates for land with a cotton allotment varied from \$30 to \$40 per acre. In instances where the operator and landlord both received receipts in proportion to expenses paid, the rental agreement was a one-fourth-three-fourths landlord-operator share for cotton, and one-third-two-thirds share for soybeans. A charge of 4 to 4½ cents per pound was made for leased cotton allotment.

Labor

Each farmer was an owner-operator. A charge of \$2.00 per hour was made for operator labor. Charges for hired labor ranged from \$1.50 to \$2.10 per hour among the farms.

Both operator and regular hired labor were fixed. Availability of both types labor imposed restraints on the farming operations, particularly during

Table 3. Expected Yields of Crops and Estimated Variable Costs per Acre
for Crops Produced on Cotton Study Farms, Southeast United States.

Crop	Unit	Expected yield per acre			Total variable costs ^{a/}		
		Coastal plain farm	Limestone valley farm	Brown loam farm	Coastal plain farm	Limestone valley farm	Brown loam farm
Cotton:							
Solid	Lb.	500	600	700	80.29	91.88	100.82
Skip-row	Lb.	--	800	1,000	--	108.75	135.06
Soybeans:							
Single crop	Bu.	35	30	35	29.93	35.91	34.09
Double crop	Bu.	--	20	25	--	19.93	29.07
Corn	Bu.	--	60	80	--	50.16	49.94
Barley	Bu.	--	40	--	--	38.33	--
Wheat	Bu.	--	--	40	--	--	21.83

^{a/}Variable costs include labor, seed, fertilizers, herbicides, insecticides, and machinery operating costs. Fixed costs (land and machinery overhead) are not included in the short-run planning horizon.

the spring planting and fall harvest seasons. Seasonal labor, available at the present wage rates, was restricted to the present level of use.

Machinery

The machinery on each farm was considered a fixed resource for that farm. Costs used in the analysis are the variable costs for each item of machinery. The capacity of planting and harvesting equipment placed limits on the acreage that could be covered during planting and harvest seasons. Custom services were assumed where it was a common practice for the farm to use custom services. The magnitude of custom activity could not exceed the extent of its present use.

Capital

An interest charge of seven percent was made for operating capital (expenditures which the operator expects to recover the total outlay in less than one year). Interest on investment capital (expenditures that are invested for more than one year) was charged at a rate of six percent. Costs for this investment capital were calculated after the analysis to determine net profit to the operator.

Government Program Options Considered

Four alternative programs affecting cotton production were considered. The provisions for each program are:

I - Base Organization: 1972 programs and prices - This alternative was used as a base organization to measure the effects of alternative programs. Cotton and feed grain program provisions for 1972 were in effect (Table 4). The analysis was based on a national average market price of \$0.22 per pound for cotton, \$1.10 per bushel for corn, and \$2.70 per bushel for soybeans. These prices were adjusted to reflect regional and quality differences. The analysis included three additional levels of cotton market prices -- \$0.19, \$0.25, and \$0.28 per pound of lint cotton.

Table 4. Cotton Program Provisions and Product Prices Used in Base Organization of Cotton Study Farms, Southeast United States

Item	Unit	Base Organization
Set-aside		
Cotton	Percent	20
Corn	Percent	20
Set-aside payment:		
Cotton	Dollar	.15
Corn	Dollar	.40
Support price:		
Cotton	Dollar	.195
Corn	Dollar	1.05
Soybeans	Dollar	2.25
Market price:		
Cotton	Dollar	.22
Corn	Dollar	1.10
Soybeans	Dollar	2.70

II - Changes in set aside and cotton payment rate: With 1972 provisions in effect, the set aside rate was decreased to 10 percent. With the base set aside (20 percent) the analysis included increases in the direct payment rate to \$0.20 and to \$0.25 per pound of cotton lint.

III - Changes in Soybean Prices: All program provisions and prices of the base solution (alternative I) were in effect with the exception of the price of soybeans, which was raised to \$3.00 per bushel. Cotton market prices of \$0.19 and \$0.22 were considered with the higher soybean price in effect.

IV - Removal of Cotton Programs: All set aside requirements, direct payments, and loan prices for cotton were removed. Program provisions and prices for other crops remained the same as in the base solution except for soybeans which was \$3.00 per bushel. Cotton was sold at the market price of \$0.25 per pound, in addition to the base price of \$0.22 per pound.

Procedure

Linear programming models were used to determine organizations that maximize returns to fixed resources subject to the resource limitations (land, labor, machinery) unique to each farm. The analysis first involved determining the optimum organization based on 1972 farm programs and prices. The base solution was then used to measure the effects of specific program and product price changes. As the analysis related to individual farms, any aggregate effects on input or product prices caused by a shift in resource use or output were not considered.

OPTIMUM FARM ORGANIZATIONS

This section summarizes the programming results with emphasis on the impact of selected program and price changes on farm income of the study farms. The results do not indicate adjustments that might be expected given the program and price assumptions for the analysis. Rather, the solutions indicate organiza-

tions that maximize returns to fixed resources under the given objectives and stated assumptions.

The incomes obtained as a result of program or price changes are presented in graphical forms in this section. Changes in farm organization that are different from the base organization are shown in tabular form in the Appendix.

Coastal Plains Farm
(600 acres)

The analysis indicates a potential net income of \$29,000 with 1972 programs and prices (Figure 2). The optimum organization included only cotton and soybeans with cotton limited to the total allotment (Appendix Table 1). There was a marked income response to changes in market prices or support payments. However, with 1972 programs, no change in farm organization or resource use was indicated except at \$0.28 cotton. In the latter case, non-allotment cotton replaced soybeans in the organization.

The removal of cotton program provisions eliminated cotton in the organization with \$0.22 cotton and significantly reduced income (Figure 3). However, the results show cotton in the organization with \$0.25 cotton, but only on the rented acreage where cotton yields average 600 pounds per acre.

Limestone Valley Farm
(700 acres)

The potential net income of this farm is \$35,800 (Figure 4). The organization includes skip-row cotton on the domestic allotment, providing land for set-aside requirements (Appendix Table 2). It also includes solid planted cotton on non-allotment land with the acreage limited by the capacity of the cotton pickers. The remainder of the land was used for soybeans double cropped with small grain. With 1972 programs, any increase in cotton price or payment rate resulted in an increase in income with no change in farm organization (Figure 4). Any land released from set-aside requirements was planted in soybeans.

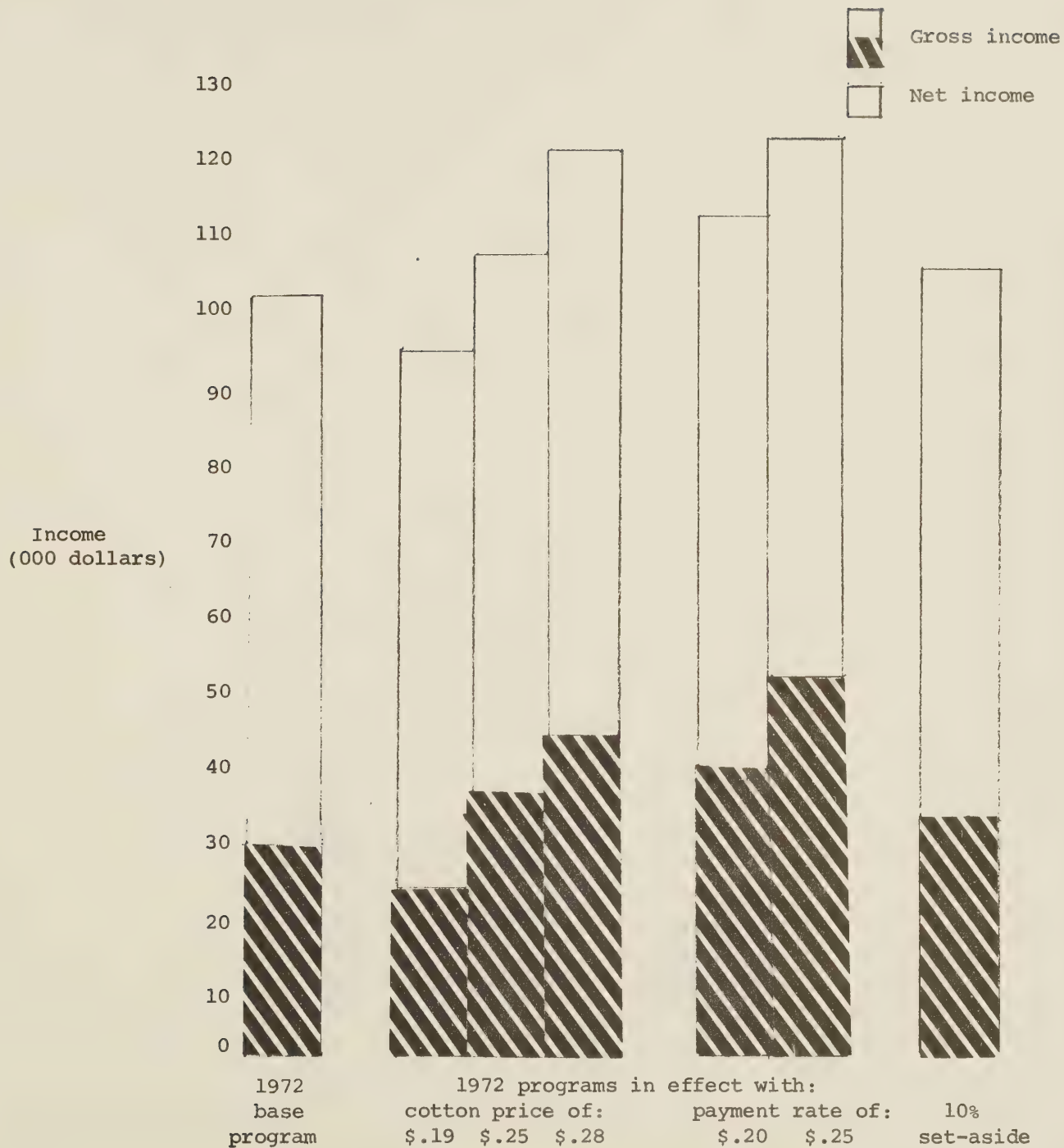


Figure 2. Estimated Effects of Modification of 1972 Cotton Program on Income of a 600-Acre Cotton Farm, Southeast Coastal Plain.

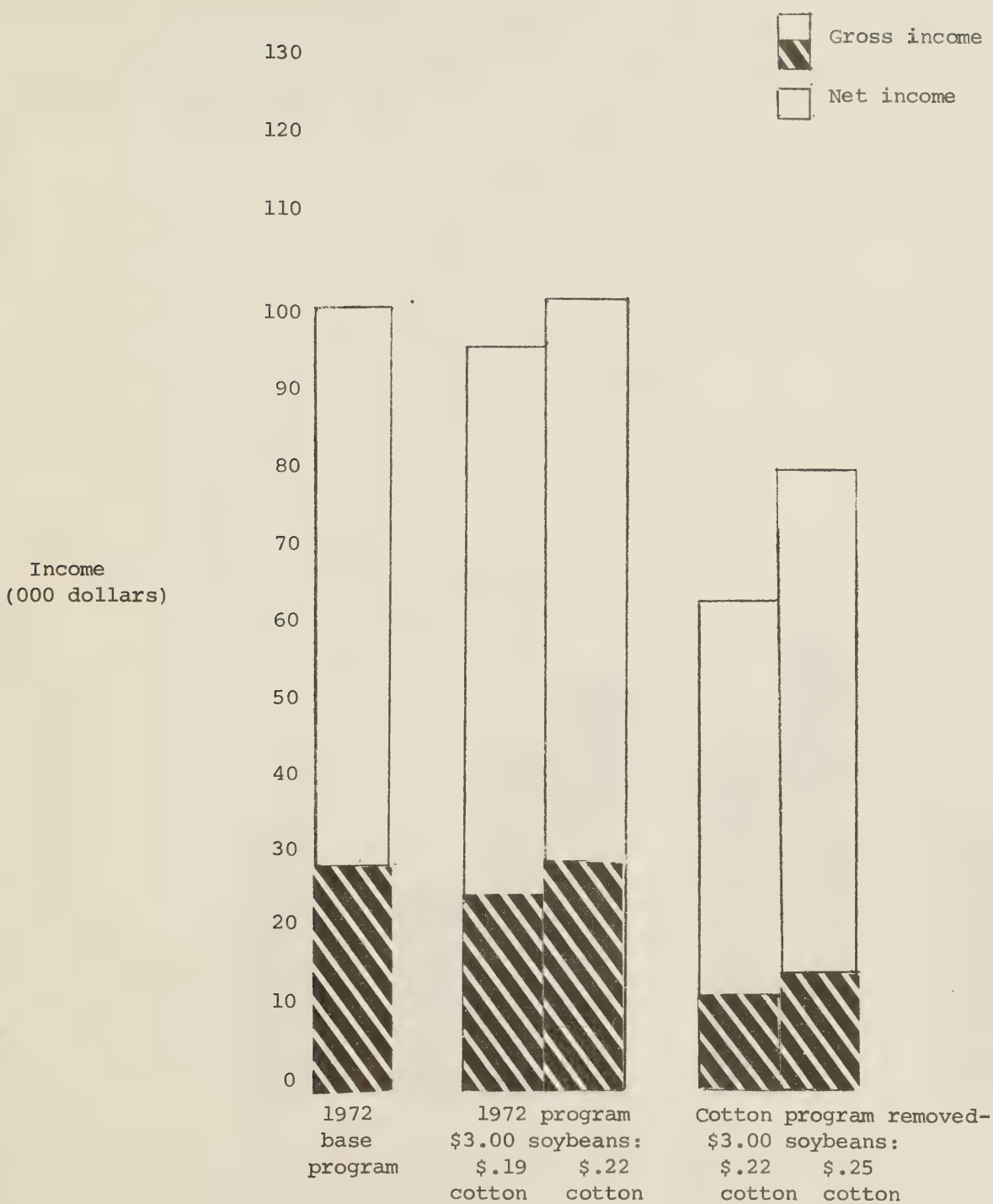


Figure 3. Estimated Effects of a Change in Soybean Price and Removal of Cotton Program on Income of a 600 Acre Cotton Farm, Southeast Coastal Plain.

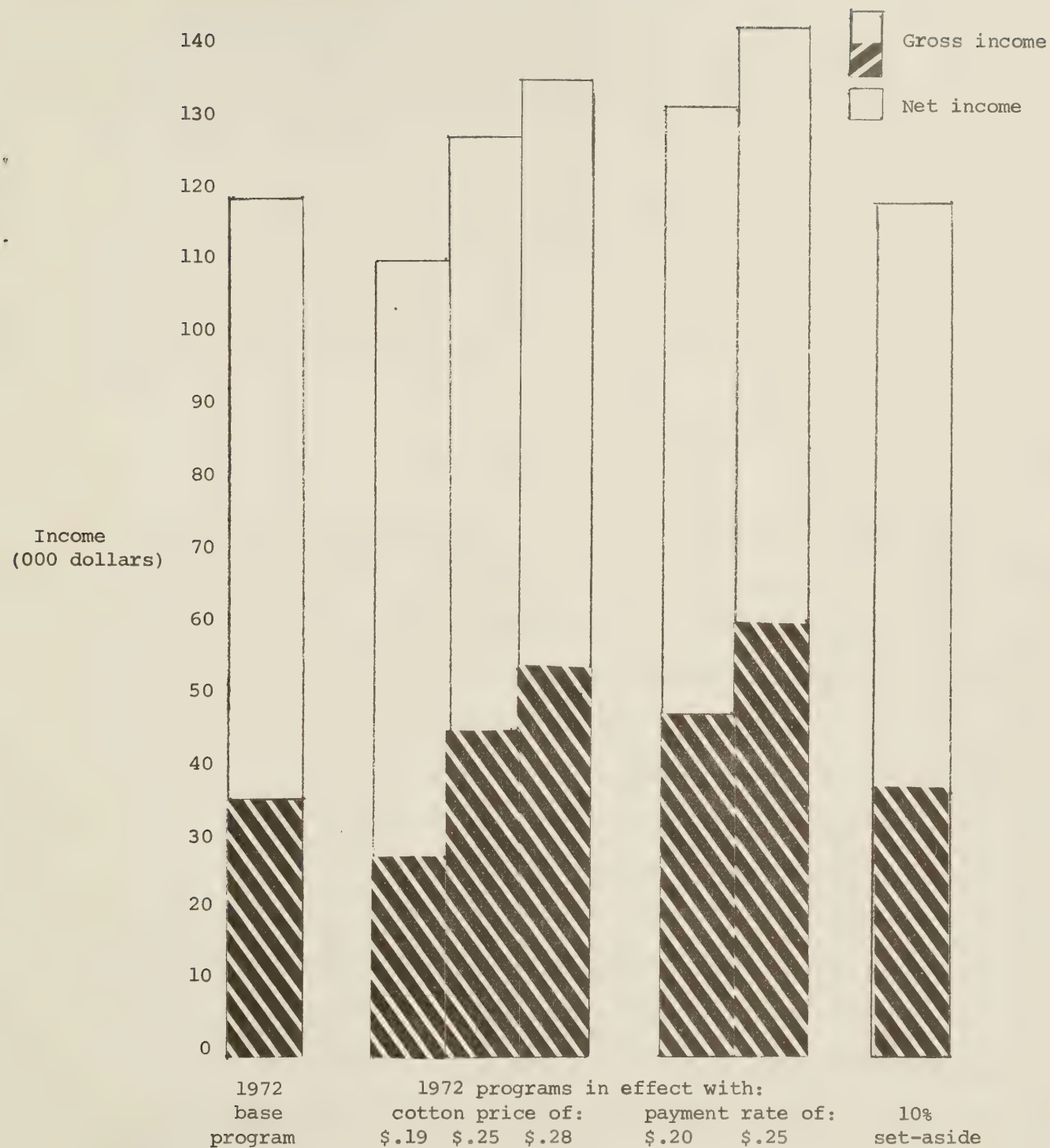


Figure 4. Estimated Effects of Modification of 1972 Cotton Program on Income of a 700 Acre Cotton Farm, Limestone Valley.

With \$0.19 cotton and \$3.00 soybeans, farm income was reduced. Although soybean production increased, this did not offset the loss in income from the lower cotton price (Figure 5).

With the removal of cotton programs, cotton remained in the organization due to the relative profitability of 600 pound cotton yields compared with 30 bushel soybean yield. However, income was reduced to a level that would likely be too low for survival due to the fixed costs associated with a farm of this size.

Brown Loam Farm
(800 acres)

The optimum base organization for this farm includes the allotted amount of cotton (450 acres) and 50 acres of solid plant non-allotted cotton (Appendix Table 3). Approximately 100 acres of soybeans are double cropped with wheat, which was restricted by June labor. This organization permits full utilization of March, May, June, and September labor, and cotton picker capacity. Due to the resource limitations, a reduction in cotton price resulted in a lower net income (Figure 6), while higher cotton prices and payments resulted in higher income levels.

The removal of all cotton programs resulted in a 70-percent decrease in net income (Figure 7). Even with a cotton price of \$.22, solid cotton with 700 pound yields is still competitive with 35 bushel soybean yields. Cotton acreage at this point is restricted by cotton picker capacity. Under this alternative the remainder of the land is in soybeans and corn, with corn entering the organization due to May labor, which is necessary for planting soybeans, being completely utilized.

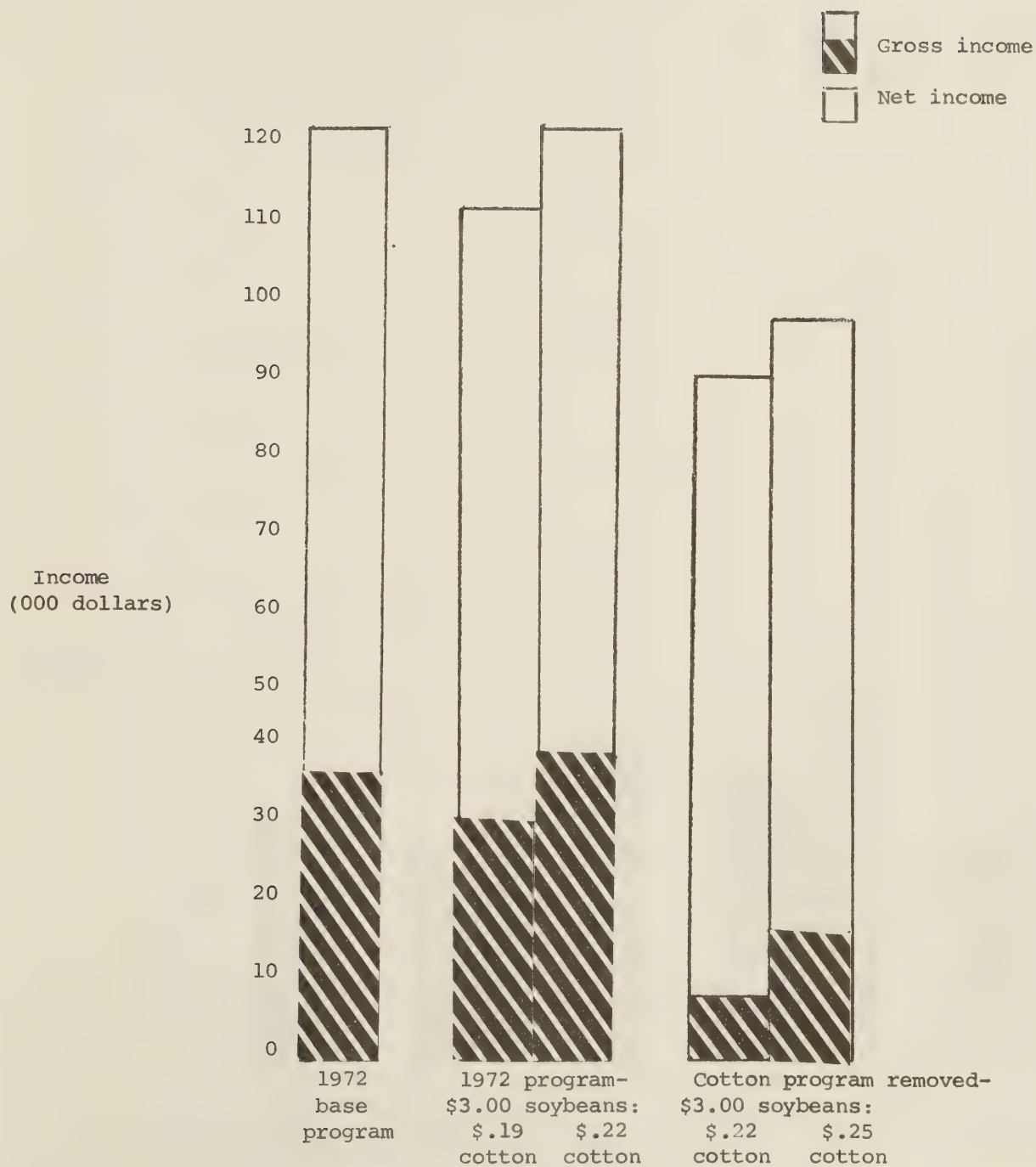


Figure 5. Estimated Effects of a Change in Soybean Price and Removal of Cotton Program on Income of a 700 Acre Cotton Farm, Limestone Valley.

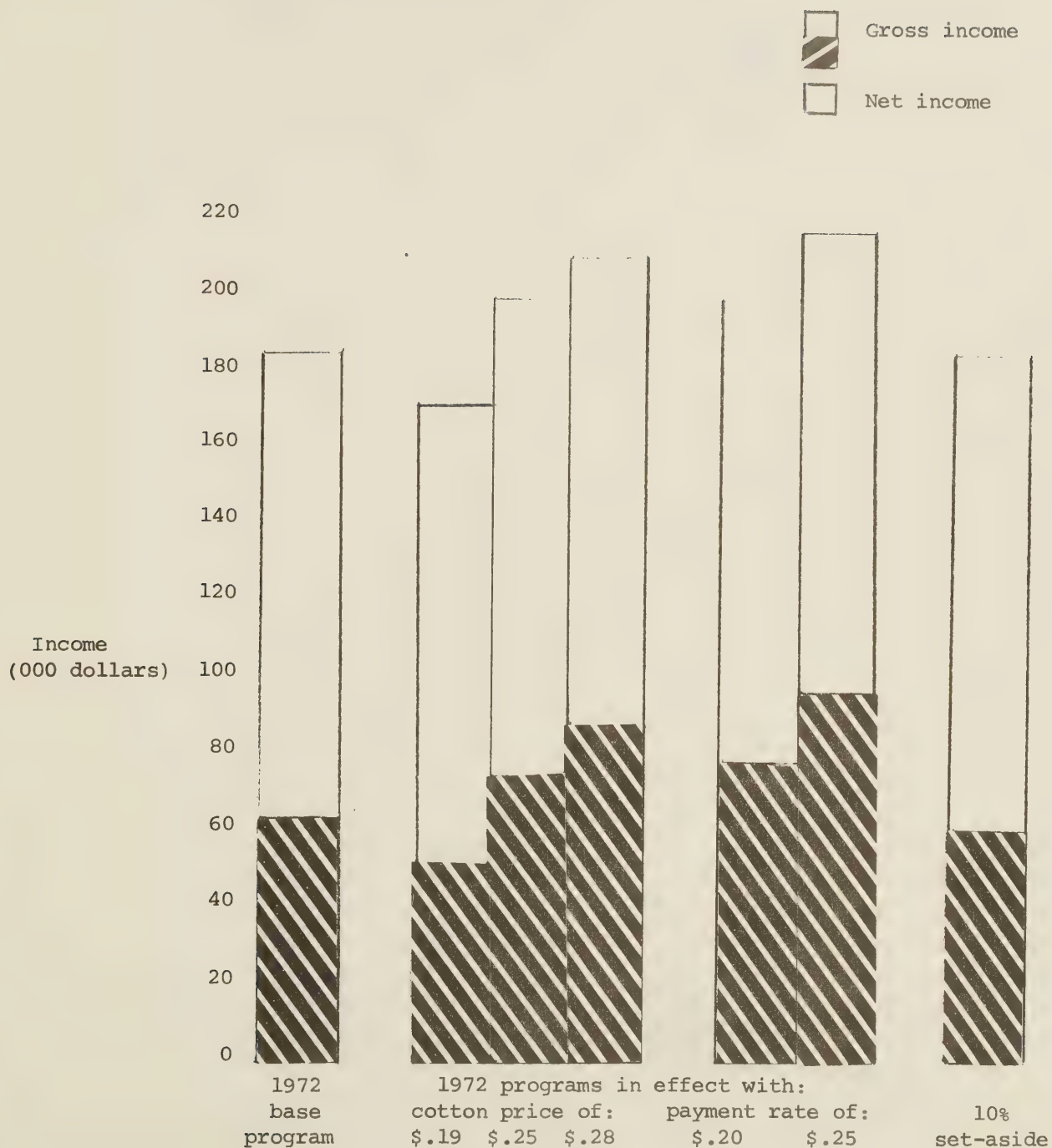


Figure 6. Estimated Effects of Modification of 1972 Cotton Program on Income of an 800 Acre Cotton Farm, Brown Loam Area.

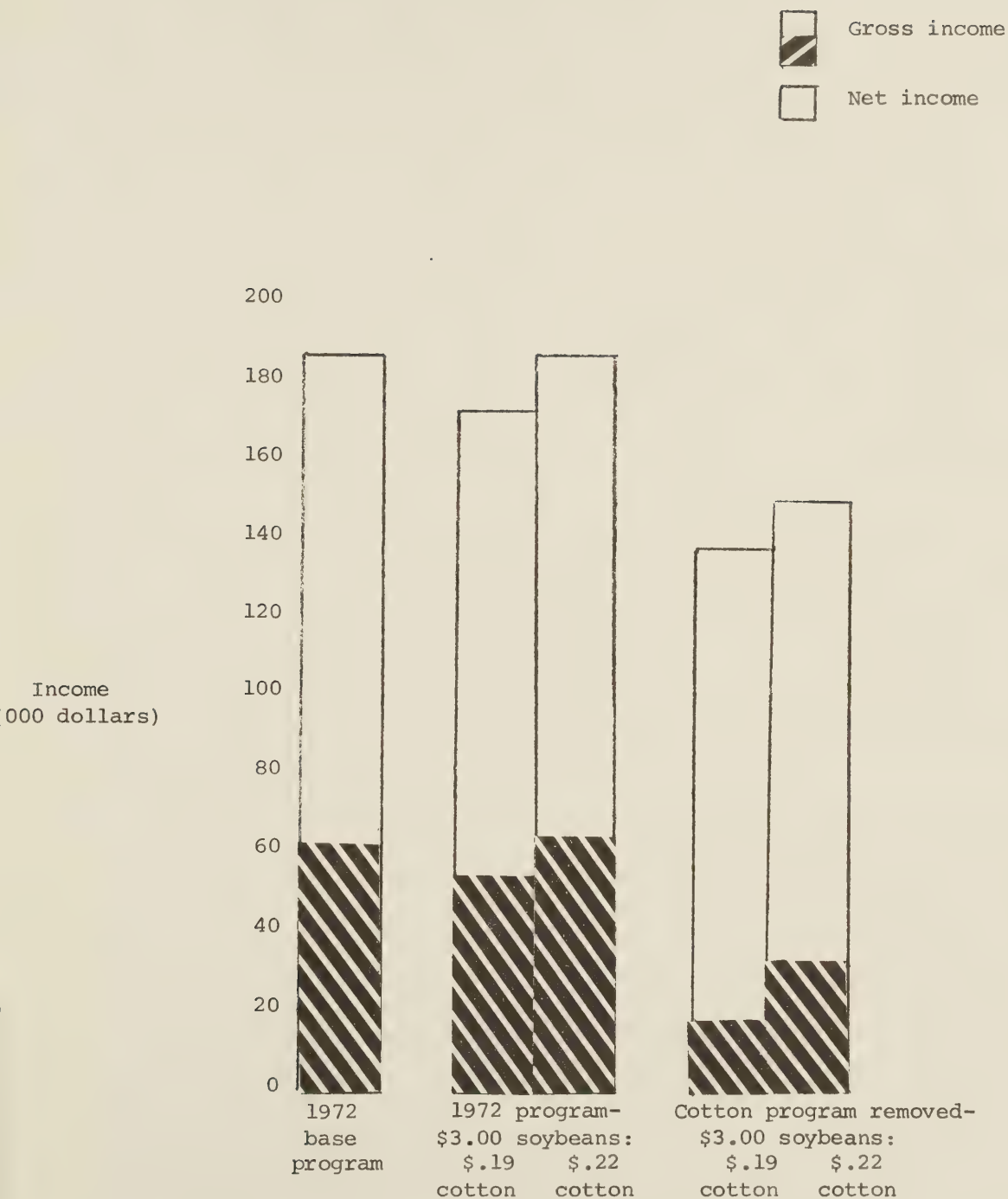


Figure 7. Estimated Effect of a Change in Soybean Price and Removal of Cotton Program on Income of an 800 Acre Cotton Farm, Brown Loam Area.

SUMMARY AND CONCLUSIONS

Cotton acreage in the Southeast United States has declined at a faster rate since 1960 than has acreage for the entire U.S. Within the Southeast, cotton acreage in the Coastal Plain of Georgia and South Carolina, the Limestone Valley of Alabama, and the Brown Loam of Tennessee has declined at a slower rate than for the entire region. While farm policy has had an aggregate effect on farm organization and production in these areas, decisions to participate or not to participate in farm programs are made at the individual farm level. These decisions, among other things, depend on expected returns from various program options. A cotton farm in each of these areas was selected for detailed study to determine the efficiencies of crop production on these farms, and to determine the effects of cotton price and program changes on the organization of these farms.

Cotton production on the farms in the Coastal Plain and the Limestone Valley are relatively equal in efficiency of production. Soybeans appear to be more efficiently produced on the Coastal Plain farm, which indicates that soybeans are likely to be substituted for cotton at a faster rate in this area in the face of declining cotton prices.

Cotton is more profitable on the Brown Loam farm than either of the farms in the other areas. In both the Brown Loam and the Limestone Valley areas non-allotted cotton is more profitable than alternative crops with present prices, however, on the farms studied, was restricted in acreage by cotton picker capacity.

In the Coastal Plain, cotton was not competitive with soybeans when the cotton payment was removed. However, with a cotton price of \$.25, cotton was competitive on land that produced higher than average cotton yields. This land composed only about one-half the acreage of the farm.

Although cotton can still be produced at a profit in the absence of cotton programs, the profit on these study farms in this situation would be reduced 50-70 percent from present levels. This level would not allow these farm operators a

return on their investment comparable with returns in other industries. Soybean production is the next most profitable alternative; however, a substantial increase in soybean prices would be necessary to allow the operators of the farms to stay in full-time farming with their present size operations.

REFERENCES CITED

- (1) Annual County Estimates. Statistical Reporting Service. Published annually by the SRS, U. S. Department of Agriculture of each state.
- (2) Costs of Producing Upland Cotton in 1971. Economic Research Service, U. S. Department of Agriculture. March 1971.
- (3) Cotton Production and Farm Income Estimates Under Selected Alternative Farm Programs. P. L. Strickland and others. Economic Research Service, U. S. Department of Agriculture. September 1971.

Appendix Table 1. Estimated Effect of Specified Changes in Cotton Program and Prices on a Cotton Farm in the Southeastern Coastal Plain.

Item	Unit	1972 program	1972 programs in effect with variations of:		Removal of all cotton program provisions with \$3.00 soybeans and:	
			1/ \$.28 cotton	Set-aside of 10 percent	\$.22 cotton	\$.25 cotton
Cotton:						
Set-aside	Acre	80	80	40	--	--
Solid (allotted)	Acre	400	400	400	--	--
Solid (non-allotted)	Acre	0	120	0	0	270
Total cotton	Acre	400	520	400	0	270
Land devoted to cotton	Acre	480	600	440	0	270
Soybeans	Acre	120	0	160	600	330
Cropland owned	Acre	200	200	200	200	200
Cropland rented	Acre	400	400	400	400	400
Total cropland	Acre	600	600	600	600	600
Production:						
Cotton	1,000 lb.	218.7	278.7	220.4	0	157.5
Soybeans	1,000 bu.	4.2	0	5.6	21.0	11.6
Operating capital	1,000 dol.	25.1	28.4	25.7	14.3	21.6
Payments received	1,000 dol.	32.8	32.8	33.1	--	--
Income:						
Gross	1,000 dol.	100.7	121.5	105.1	63.0	80.1
To land and farm overhead	1,000 dol.	40.6	54.8	43.9	25.2	27.1
Net	1,000 dol.	28.6	42.8	31.9	13.2	15.1

$\frac{1}{}$ Based on 1972 program provisions for cotton and feed grains, and market price expectations for other crops. See text, pp. 1-2.

Appendix Table 2. Estimated Effect of Specified Changes in Cotton Program and Prices on a Cotton Farm in the Limestone Valley of Alabama.

Item	Unit	1/ 1972 program	1972 programs in effect with variations of:		Removal of all cotton program provisions with \$3.00 soybeans and:	
			Set-aside of 10 percent	\$3.00 soybeans and \$.19 cotton	\$.22 cotton \$.25 cotton	
Cotton:						
Set-aside	Acre	87	67	87	--	--
Solid (allotted)	Acre	330	350	330	--	--
Solid (non-allotted)	Acre	37	37	0	452	452
Skip-row (allotted)	Acre	95	75	95	--	--
Skip-row (non-allotted)	Acre	0	0	0	10	10
Total cotton	Acre	462	462	425	462	462
Land devoted to cotton	Acre	549	529	512	462	462
Soybeans						
Single crop	Acre	143	163	180	230	230
Double crop	Acre	0	0	0	0	0
Total soybeans	Acre	143	163	180	230	230
Corn:						
Set-aside	Acre	8	8	8	8	8
Planted	Acre	0	0	0	0	0
Land devoted to corn	Acre	8	8	8	8	8
Cropland owned	Acre	300	300	300	300	300
Cropland rented	Acre	400	400	400	400	400
Total cropland	Acre	700	700	700	700	700
Production:						
Cotton	1,000 lb.	291.4	289.4	239.6	278.9	278.9
Soybeans	1,000 bu.	3.0	3.4	4.1	4.6	4.6
Operating capital	1,000 dol.	27.5	27.6	26.4	26.9	26.9
Payments received	1,000 dol.	36.4	36.2	35.9	.5	.5
Income:						
Gross	1,000 dol.	118.6	119.0	109.4	86.2	94.4
To land and farm overhead	1,000 dol.	55.8	56.0	48.8	26.6	34.9
Net	1,000 dol.	35.8	36.0	28.8	6.6	14.9

^{1/} Based on 1972 program provisions for cotton and feed grains, and market price expectations for other crops. See text, pp.

Appendix Table 3. Estimated Effects of Specified Changes in Cotton Program and Prices on a Cotton Farm in the Brown Loam Area of Tennessee.

Item	Unit	1972 ^{1/} program	1972 program in effect with variations of:				Removal of all cotton program provisions with \$3.00 soybeans and \$.22 cotton
			\$.19 cotton	Payment	Set-aside	\$3.00	
				rate of \$.20	of 10 percent	soybeans and \$.19 cotton	
Cotton:							
Set-aside	Acre	90	90	90	45	90	--
Solid (allotted)	Acre	350	300	300	350	300	--
Solid (non-allotted)	Acre	50	0	0	50	0	500
Skip-row (allotted)	Acre	100	150	150	100	150	--
Total cotton	Acre	500	450	450	500	450	500
Diversion (skip-row)	Acre	10	60	60	55	60	0
Land devoted to cotton	Acre	600	600	600	600	600	500
Soybeans							
Single crop	Acre	97	97	97	97	97	132
Double crop	Acre	103	103	103	103	103	130
Total soybeans	Acre	200	200	200	200	200	262
Corn							
	Acre	0	0	0	0	0	38
Small grain							
Double crop	Acre	103	103	103	103	103	130
Total cropland owned	Acre	800	800	800	800	800	800
Production:							
Cotton	1,000 lb.	380.0	360.0	360.0	380.0	360.0	350.0
Soybeans	1,000 bu.	6.0	6.0	6.0	6.0	6.0	7.9
Corn	1,000 bu.	0	0	0	0	0	3.1
Small grain	1,000 bu.	4.1	4.1	4.1	4.1	4.1	5.2
Operating capital							
Payments received	1,000 dol.	51.8	54.0	90.0	51.8	54.0	0
Income:							
Gross	1,000 dol.	185.5	171.0	199.8	185.5	172.8	138.0
To land and farm overhead	1,000 dol.	101.4	90.5	119.3	101.4	92.2	58.0
Net	1,000 dol.	61.4	50.5	79.3	61.4	52.2	18.0

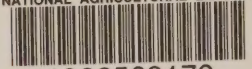
^{1/} Based on 1972 program provisions for cotton and feed grains, and market price expectations for other crops. See text, pp.

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